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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/228,148	01/11/1999	YASUNORI INOUE	970150A	7239

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EXAMINER

MALDONADO, JULIO J

ART UNIT PAPER NUMBER

2823

DATE MAILED: 02/26/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/228,148

Applicant(s)

INOUE ET AL.

Examiner

Julio J. Maldonado

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 December 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 9-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 9, 10 and 13-18 is/are rejected.
- 7) ☒ Claim(s) 11 and 12 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 27.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 9, 10, 13 and 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Leong (U.S. 5,192,697) in view of Sasaki et al. (U.S. 5,818,068).

Leong (Figs.1-3) in a related method for curing SOG by ion implantation teaches forming a first insulation film (24) on a conductive layer (20) formed on the substrate (10); introducing impurities into said first insulation film (24); forming a silicon oxide layer (22) prior to forming said first insulation film (24); forming a third insulation film (26) on said first insulation film (24) after said step of forming impurities into said first insulation film (24); and including an inorganic SOG film on said first insulation film, said step of introducing is carried out by ion implantation and said impurities include argon (column 2, line 33 – column 4, line 63).

Leong fails to expressly teach using the silicon oxide layer as an intrusion prevention film to substantially prevent the impurities introduced into said first insulation film from entering said conductive layer. However, Sasaki et al. (Fig.3A) in a related method to form transistor teach using a silicon oxide layer (31) as an intrusion prevention film (column 10, lines 44-49). Therefore, it would have been obvious to one

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of ordinary skill in the art at the time of the invention was made to use the silicon oxide film as an intrusion prevention film as taught by Sasaki et al. prior to forming the first insulation film of Leong, since the silicon oxide prevents contamination due to diffusion of impurities into layers below that of the oxide (column 10, lines 44-49).

3. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Leong ('697) in view of Sasaki et al. ('068) as applied to claims 9, 10, 13 and 15-18 above, and further in view of Wolf.

Leong in combination with Sasaki et al. substantially teach all aspects of the invention, but fail to teach that the first insulation film includes silicon oxide containing at least 1% of carbon. However, Wolf in an analogous art related to multilevel interconnect technology teaches that SOG films include silicon oxide should contain at least 1% carbon to improve cracking resistance (pages 232-233). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to utilize the silicon oxide films having at least 1% of carbon as taught by Wolf in the SOG curing method of Leong and Sasaki et al., since this would improve cracking resistance (pages 232-233).

Allowable Subject Matter

4. Claims 11 and 12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

5. The following is a statement of reasons for the indication of allowable subject matter

The prior art of record, Leong to 5,192,697 in a related method for curing SOG by ion implantation teaches forming a first insulation film (24) on a conductive layer (20) formed on the substrate (10); introducing impurities into said first insulation film (24); forming a silicon oxide layer (22) prior to forming said first insulation film (24); forming a third insulation film (26) on said first insulation film (24) after said step of forming impurities into said first insulation film (24); and including an inorganic SOG film on said first insulation film, said step of introducing is carried out by ion implantation and said impurities include argon (column 2, line 33 – column 4, line 63).

However, the prior art fail to teach forming a second insulation film on a conductive and the intrusion prevention film prior to forming the first insulation film, wherein said second insulation film includes a film less hygroscopic than said first insulation film.

Response to Arguments

6. Applicant's arguments filed 12/21/2002 have been fully considered but they are not persuasive.

Applicants' argue, "...the Examiner acknowledges that Leong fails to teach an intrusion prevention film to substantially prevent the impurities introduced into the first insulation film from entering the conductive layer...". Also, applicants' argue, "...Sasaki et al. fail to suggest to one of ordinary skill in the art to employ an intrusion prevention film to substantially prevent the impurities introduced into said first insulation film from entering said conductive layer...". In response to this argument, on the action mailed on 08/12/2002, it was submitted that Leong fail to teach using the silicon oxide (20) as an

intrusion prevention film, which is one of the materials disclosed as an intrusion prevention film. On the other hand, Sasaki et al. teach that silicon oxide can be used as an intrusion prevention film, not "...to employ an intrusion prevention film to substantially prevent the impurities introduced into said first insulation film from entering said conductive layer..." as argued. Therefore, the silicon oxide layer (20) of Leong can be used as an intrusion prevention film as taught by Sasaki et al.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8. Papers related to this application may be submitted directly to Art Unit 2823 by facsimile transmission. Papers should be faxed to Art Unit 2823 via the Art Unit 2823 Fax Center located in Crystal Plaza 4, room 3C23. The faxing of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (15 November


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1989). The Art Unit 2823 Fax Center number is **(703) 305-3432**. The Art Unit 2823 Fax Center is to be used only for papers related to Art Unit 2823 applications.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Julio J. Maldonado** at **(703) 306-0098** and between the hours of 8:00 AM to 4:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via julio.maldonado@uspto.gov. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri, can be reached on (703) 306-2794.

Any inquiry of a general nature or relating to the status of this application should be directed to the **Group 2800 Receptionist** at **(703) 308-0956**.

JMR
2/14/03


George Fourson
Primary Examiner
2823